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In the early years of the foreign settlements when foreigners were permitted into the hinterland for half a day's travel from the city (since they were originally not allowed to spend a night beyond the Settlements), they moved very largely by boat, and "they inevitably met on the way dung boats, dung tanks, dung buckets, and dung carriers wherever they went."[49] Until 1923 (the 1925 population of Shanghai was approximately 2,300,000, including 29,000 foreigners), there were virtually no flush toilets anywhere in the city and no central sewage system. The human wastes (or night soil) and the garbage of the city, in common with the usual practice in east Asia, were carefully saved and "sold" to contractors, who were paid a small fee for their services in removing the wastes and distributing them for sale to the farmers of the delta. Up to 1923, when a central sewage system was installed, these night soil contractors collected the wastes at most of the houses in Shanghai, including the foreign houses, and were under contract to the Shanghai Municipal Council for the removal of wastes collected by the Council from public buildings and a few private houses within the International Settlement. The Council realized an average annual revenue between 1910 and 1920 of US$50,000 from these transactions.[50]

The Council made its first contract with the night soil collectors in 1867 because it was alarmed by the health menace presented by the promiscuous dumping of wastes of all kinds in the creeks which flowed through the Settlement. Night soil contractors had been operating in the Settlement for several years before this date, but they had not removed all of the wastes, and the Council in its new contract provided for a complete disposal system.[51] By 1932, the Health Commissioner of the International Settlement was defending this system as essential not only to the health of the Settlement but to the productivity of the farms which supplied it with food.[52] As a means of disposing of the city's refuse it also had notable advantages of economy, if not of attractiveness to the foreign residents. The Council estimated in 1920 that the cost of collection and disposal of household wastes in Shanghai over the period 1908–1919 averaged about 1s 2d per ton, as against an estimated cost in London at the same period of 9s 1d per ton.[53]

In 1923 the Council built the first central sewage system, which

2: Murphy G-4 (no date) 1953 AF15 East China AF15

by 1934 included four sewage-treatment plants and two incinerators for household refuse. During the same period cesspools were dug for most buildings in the Settlement beyond the limits of the central sewage system. The night soil contractors continued to remove wastes from buildings without cesspools, and, by agreement with the Council, to drain the cesspools at regular intervals. Most of the sewage treated by the new plants was sold to the night soil contractors as before, but now in a concentrated form which was also less dangerous to health when used as fertilizer. Non-organic wastes were dumped at sea by the Council, or were used for raising low-lying land. Household garbage continued to be collected by the night soil contractors as before.[54] These malodorous cargoes went out from Shanghai entirely in barges, many of which were open and which were (and still are) to be seen on all of the waterways running through the city. It was these which attracted the adverse comment to which the Municipal Health Commissioner replied in the statement referred to above.

The night soil produced by two, three, or four million people and distributed to farmers must have been a not inconsiderable factor in maintaining or enhancing soil fertility and in making possible unusually high yields within a thirty- or forty-mile radius of Shanghai.* Existing figures for crop yields are unfortunately calculated on the basis of *hsien*, and *hsien* boundaries do not even approximately coincide with the thirty- or forty-mile radius. The Municipality of Greater Shanghai itself occupies 320 square miles (of which 210 square miles is listed as farm land) within the area of night soil distribution from the city. The effect of this distribution therefore cannot be measured with any accuracy in terms of crop yields, although the figures do show about 10 per cent higher yields of all crops in the *hsien* which have some part of their area within a forty-mile radius of Shanghai than in the remaining *hsien* in the Kiangsu section of the delta south of the Yangtze and east of Tai Lake.[55] Soil and land forms are generally uniform over this area. It is a readily observable fact that fields are greener and crops heavier and further advanced within a day's foot or water travel

* See above, p. 137. Buck's figure was compiled from surveys in only one district (about one quarter of one *hsien*) within this area.